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ABSTRACT

The Vanderbilt Summer Research Program in diabetes, which was designed to interest medical students in research careers and diabetes care, was evaluated. The program provides stipends to 20 sophomore and junior medical students for 12 weeks of preceptor-supervised laboratory research work, clinical experience, and classroom instruction. The evaluation design includes the Discrepancy Evaluation Model, which describes differences between program standards and realities. A second evaluation focus compares the long-term effect on program participants vs. a sample of nonparticipant applicants. Results indicate that the program has successfully attracted students naive to biomedical research. All students reported adequate research supervision and instruction, although there was significant variation in the extent to which students, preceptors, and other lab personnel collaborated. Students devoted the vast majority of time to conducting research, spending less time in the classroom and very little in the clinic. All students showed significant pre-post gains on tests that sampled knowledge about diabetes and research design. Finally, in comparison to nonparticipants, participants have published and presented more research papers, and are more interested in pursuing careers in diabetes care. (Author/SW)

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DOES EARLY RESEARCH EXPERIENCE AFFECT SUBSEQUENT CAREER CHOICE?

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Davis and Kelley (1) surveyed the factors associated with successful clinical scientists' decisions to pursue research careers. They recommended that research opportunities for medical students be promoted. This paper describes an ongoing evaluation of one such training program.

The goal of the Vanderbilt University Summer Research Program in Diabetes, operating since 1975, is to help reverse the national decline in the number of medical students who choose research careers. A secondary goal is to interest the participants in diabetes care. The program provides stipends for twenty rising sophomore and junior medical students from Vanderbilt and other medical schools for twelve weeks of preceptor-supervised laboratory research work, clinical experience, and classroom instruction.

The evaluation design consists of two parts. The first is based on the Discrepancy Evaluation Model (2) and describes differences between program standards and realities. The second evaluative focus compares the long-term effect on program participants vs. a sample of non-participant applicants.

In brief, the program has successfully attracted students naive to biomedical research and has provided appropriately challenging projects. All students reported adequate research supervision and instruction, although there was significant variation in the extent to which students, preceptors, and other lab personnel actually collaborated. Students devoted the vast majority of time to conducting research, spending less time in the classroom and very little in clinic. All students showed significant ($p < .05$) pre-post gains on tests which sampled knowledge about diabetes and research design.

Finally, program participants have published and presented more research papers, intend to spend more time on research "10 years from now," and more intend to pursue careers in diabetes care than members of the comparison group. The program is too young to draw firm conclusions, but it seems to provide experiences which have reportedly influenced the career decisions of successful researchers.

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Does Early Research Experience Affect Subsequent Career Choice?

The purpose of this paper is to present the findings of 2 evaluations conducted at Vanderbilt University. The subject of these evaluations was a three month Vanderbilt Summer Research Program in diabetes. The program gives medical studies the opportunity to engage in diabetes research under the supervision of the prominent faculty members of the Vanderbilt Medical Center affiliated with the Diabetes Research and Training Center. The Program was established to help reverse the prolonged and systematic decline in the number of medical students in this country who choose careers which include clinical research. A secondary goal of the program is to interest students in diabetes care.

The program was begun in 1975. Approximately 20 medical students from Vanderbilt and other medical schools are awarded stipends each year. Most of these participants have completed one year of medical school. Less frequently, a student will participate who has finished his or her second year.

Participants are supervised by Vanderbilt Medical School Faculty members who are affiliated with the Diabetes Research and Training Center. Each student does work related to the supervisor's ongoing basic science or clinical research. For the most part, students are able to select the projects and faculty advisors with whom they wish to work. Students are not laboratory assistants per se. Each participant is responsible for conducting a specific research project, for organizing data, and for presenting a paper at the conclusion of the summer at a special research seminar. Students also attend two lectures each week on a variety of topics related to diabetes care and research.

The program is based on the premise that medical students are influenced in their career choices by two complementary types of experiences. Davis and Kelley (1982) found that successful clinical researchers were influenced to pursue their careers by early exposure to their particular field. Secondly, Paiva et. al. (1982) reported that medical students' career selections appeared to be strongly influenced by their interactions with faculty members. Furthermore, of relevance to the Vanderbilt Program is the finding that interactions with role models were found to most often influence the decisions of students entering less popular specialties.

The evaluation design consisted of two parts. The first part, a follow-up impact evaluation conducted in 1980, studied the long term effects of the program on past participants. The second focus, a formative evaluation based on the discrepancy evaluation model (Provus, 1971), described the program and examined the extent to which the program met its own standards. First, the initial follow-up evaluation will be reviewed. It was conducted in 1980 by a medical student named Kevin Luidal under the direction of Philip Felts, M.D., and James W. Pichert, Ph. D.

The findings should be viewed as preliminary and as a small part of a much larger evaluation of this program. The fact is that the outcome measures in which we are most interested, i.e., selection of research careers, will not become apparent until six to eight years after participation in the program.

The impact evaluation was conducted as follows. Questionnaires were mailed to participants and a comparison group of nonparticipant applicants from the previous five years. Sixty-seven percent (n=30) of the former participants, and 72% (n=53) of the comparison group returned completed questionnaires.

The comparison group consisted of nonparticipant applicants. This design is admittedly flawed in that the assignment to the two groups was not random. Nonparticipant applicants were rejected for a variety of reasons. However, all students applying to the program are successfully enrolled in highly competitive medical schools and it is assumed that the difference between the quality of students in the two groups is not extreme. Nonparticipant applicants were selected as the comparison group rather than a random group of medical students so as to match the two groups as closely as possible on initial interest in diabetes and research.

The comparisons that I will report were all found to be statistically significant at the .05 level using chi-square analyses unless otherwise stated.

The results of the follow-up were quite positive. 70% of the experimental group, as compared to 37% of the comparison group, reported planning to spend a significant amount of time doing research during their careers. In addition, 80% of the former participants have authored papers or have given research presentations, as compared to only 34% of the comparison group.

It was found that an equal percentage of both groups, 34%, have participated in one additional research undertaking. However, 13% of the former participants engaged in more than one subsequent project, whereas only 2% of the comparison group did so. This finding is notable, although it did not reach statistical significance.

Finally, former participants were more likely to conduct diabetes-related research. Of those former participants who did one additional research project, 50% of them did diabetes-related work. Of those former participants who did two additional projects, 33% did diabetes-projects. The corresponding figures regarding the research activities of the comparison group are 33% and 0%, respectively.

The results concerning subsequent research involvement are important to the program planners because the interim goal of the program is to heighten students' interest in research so that they will subsequently seek out other research opportunities available to them. It would probably be unrealistic to expect that one, three month research experience in isolation would be able to influence a significant number of students' career selections. Rather, the expectation is that students will choose research careers because of the net effect of several research experiences. The data presented above indicate that this interim goal seems to have been met. Former participants, do in fact seek out opportunities to be involved in research subsequent to the program, particularly diabetes-related research.

Finally, in terms of the second goal of the program, to increase interest in diabetes care, the results were also quite positive. Sixty-one percent of the former participants reported planning to specialize in internal medicine, the specialty that would include caring for diabetic patients, as compared to 52% of the comparison group. Furthermore, and more importantly, of those students going into internal medicine, 20% of the former participants plan to subspecialize in endocrinology, whereas only 6% of the comparison group reported plans to specialize in this area.

In conclusion, the results of the follow-up evaluation suggest that the Vanderbilt program raises interest both in diabetes-related research and diabetes care.

Next, the process oriented "DEM" evaluation (Provus, 1971) will be discussed. During the summer of 1982, the authors conducted a descriptive evaluation for purposes of program improvement, and in order to better describe the attributes of the program which led to the positive results of the first follow-up study.

Data were collected by interviewing program participants at three separate times during the summer. Faculty supervisors were interviewed once. Of the 20 pairs of students and advisors, only 16 were interviewed: the other 4 pairs did their projects in other cities and were not accessible. To reduce the tendency of respondents to give only positive comments about the program, the interviewer explained that the goal of the evaluation was to improve the program for future participants. It seemed that both faculty members and students were uninhibited in expressing their opinions.

Four major components to the program were delineated. The next section outlines these components, and describes the extent to which the program met its objectives.

The first major objective of the program is that students should have prolonged and positive experiences with their faculty supervisors. It was found that there were two types of contact between students and supervisors: formal and informal. Informal supervision took place when advisors were in the same vicinity as the students, but were not directly engaged in advising or overseeing the students' particular projects. Seven students received almost continuous informal supervision, in addition to two hours per week of formal supervision. This group will be referred to as group 1. In the second group, referred to as group 2, were six students who worked in the same vicinity as other lab personnel, but who received no informal supervision from their official advisors and only 1-1/2 hours per week of formal consultation. Finally, in group 3 were three students who generally worked alone and therefore did not receive any informal supervision. However, these students received a great deal of formal supervision. Despite these differences in amount of contact between advisors and students, no student reported receiving inadequate supervision. However, five students said that they were dissatisfied with the lack of personal contact with their advisors. As might be expected, four of these students were from group 2, and one from group 3.

In addition to having close working relationships with their preceptors, it is also hoped that students have enjoyable experiences working with their preceptors. This objective appears to have been met. First of all, all students and advisors reported that they were satisfied with their research partners. Furthermore, although participants had only completed one year of medical school, only two of them reported any difficulty due to lack of sufficient background in research. Also, only three advisors would have preferred to work with students with more research experience. This is an interesting finding, as one might expect faculty participants to prefer students with research experience, since less time would be required for their training.

Finally, 58 of 64 responses to interviewer questions indicated that students felt that their projects were creative, well designed, relevant, and interesting.

The second major objective of the program is that students should be provided with adequate and informative instruction in diabetes and research methods. Students were instructed in two arenas: in the laboratory, and by means of a lecture series.

In terms of laboratory instruction, evaluators did not administer a pre-post knowledge test because many types of research projects were done, and thus the training of each student was highly individualized. However, students were asked to estimate the amount of instruction time within the laboratories. All students reported that advisors and technicians did not simply give them busy work, but gave them quite a bit of instruction, and assigned challenging tasks. Students reported receiving 3 hours of instruction in research procedures by laboratory personnel in an average week. Instruction in diabetes in the laboratories was less intensive, averaging 1-1/2 hours per week. However, laboratory instruction in diabetes was supplemented by the lecture series.

It is not clear how much students learned from the formal lecture series. In the past, the lecture series has proven to be very worthwhile and informative. Students have consistently demonstrated significant pre-post knowledge test gains. For the 1982 evaluation, the knowledge test was updated in an attempt to more accurately reflect the content material of the series. Secondly, attendance at the lectures was not mandatory and the average student skipped 5 out of 18 lectures, generally due to their involvement in the laboratory. The change in the knowledge test, and the attendance rate, are assumed to at least partially explain why posttest scores showed little improvement in 1982. The average post test score was 65% as compared to the pretest average of 61%. In effect, only four students showed significant improvements in scores whereas most students' scores remained relatively stable.

Responses to "consumer satisfaction" questions about the lectures were very positive. Students rated a series of lectures every third week, and 190 of the 194 responses stated that the lectures were relevant. 17 of the 18 lectures were described as being clear and well organized, and 16 as being delivered in an interesting and enthusiastic manner. Finally, for the majority of the students, 14 of the 18 lectures covered basically new information.

The third major goal of the program is to provide research opportunities to medical students who have not had any significant exposure to research.

This objective was clearly met in terms of the research program's recruitment procedures. All eleven Vanderbilt participants reported that the program had been publicized widely and effectively. Also, all students agreed that the recruitment material effectively communicated to the student body that prior research experience was not a prerequisite for admission into the program.

However, Vanderbilt was much less successful in recruiting out-of-town students with little research experience. Three of the four out-of-town participants reported that the program description had been interpreted to mean that prior research experience would be a principal criterion for acceptance into the program.

The last major objective of the program is that the students have productive and successful summers. This standard also held up well in the evaluation. Eleven students reported that their data will be published in professional journals. The other five felt that their data would be the basis for important future investigations.

Some preliminary data concerning the extent to which the 1982 program impacted on the behaviors and attitudes of the student participants were also collected. It was found that at least four students expect to continue working with their advisors by helping to write research publications. Also, nine students reported increased enthusiasm for doing research at the completion of the program. In contrast, two students reported being less likely to engage in subsequent research.

To summarize, the Vanderbilt Summer Student Research Program is for the most part functioning as intended. However, attempts will be made to increase faculty-student contact and to improve attendance at the lecture series, amount other things.

Not only are the program components in place, but the program has also been shown to produce the desired interum effects. Former participants are more actively and successfully engaged in research and are more interested in pursuing careers in diabetes research and care then their comparison group. Further documentation of long-term program impacts is, however, necessary before any definitive conclusions can be drawn.

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